What is claimed is:

1. A composition, comprising:

a carrier; and

an osteotherapeutic material;

wherein the carrier is a macromer comprising: (a) a water-soluble block; and (b) at least one of: (i) a biodegradable block, wherein the biodegradable block comprises a linkage based on a carbonate or ester group; and (ii) a polymerizable group.

2. The composition of claim 1, wherein the composition is in the form of one of: (a) an aqueous mixture; and (b) a non-hydrated form.

3. The composition of claim 2, wherein the osteotherapeutic material is selected from the group of: (a) demineralized bone matrix; and (b) cortical-cancellous bone chips.

4. The composition of claim 2, wherein the osteotherapeutic material is selected from the group of: (a) an osteoinductor; (b) an osteoconductor; (c) an osteogenic factor; and (d) an osteopromoter.

5. The composition of claim 2, wherein the composition is resorbed and replaced by new bone substantially throughout the volume of the composition after implantation in a vertebrate.

6. The composition of claim 5, wherein a ratio of the carrier to the osteotherapeutic material is selected to provide an effective amount of each such that the composition is resorbed and replaced by new bone substantially throughout the volume of the composition.

7. The composition of claim 5, wherein the osteotherapeutic material is provided in an effective amount such that the composition is resorbed and replaced by new bone substantially throughout the volume of the composition.

8. The composition of claim 5, wherein the vertebrate is a mammal.

9. The composition of claim 8, wherein the mammal is a human.

10. The composition of claim 2, further including an initiator for inducing a polymer forming reaction with the polymerizable group.

11. The composition of claim 10, wherein the initiator is included in the carrier.

12. The composition of claim 10, wherein the initiator is selected from the group of: (a) a photo initiator; (b) a thermal initiator; and (c) a chemical initiator.

13. The composition of claim 12, wherein the photo initiator is Eosin Y.

14. The composition of claim 12, wherein the chemical initiator is a peroxide.

15. The composition of claim 2, wherein polymerization is initiated by a reaction selected from the group of: (a) photopolymerization; (b) chemical free-radical polymerization; (c) thermal free-radical polymerization; (d) redox reaction; (e) cationic polymerization; and (f) chemical reaction of active groups.

16. The composition of claim 2, wherein the carrier is further comprised of a free radical generating combination of a transition metal, a peroxide, and a stabilizing agent.

17. The composition of claim 2, wherein the macromer comprises at least one of: (a) poly(ethylene glycol); (b) trimethylene carbonate moieties; (c) lactic acid ester moieties; (d) acrylic ester moieties; and (e) combinations thereof.

18. The composition of claim 2, further comprising an additive to modify at least one of a physical and a chemical aspect of the composition.

19. The composition of claim 2, further comprising an additive to modify a biological aspect of the composition.

20. The composition of claim 1, wherein the water soluble block is selected from the group of poly(ethylene glycol) and poly(ethylene oxide).

21. The composition of claim 1, wherein the biodegradable block includes polymers and oligomers of hydroxy acids.

22. The composition of claim 1, wherein the ester group includes hydroxy acid ester moieties selected from the group of glycolic acid, DL-lactic acid and L-lactic acid.

23. The composition of claim 1, wherein the carbonate group is selected from a group derived from at least one of trimethylene carbonate and dimethyl carbonate.

24. The composition of claim 1, wherein the polymerizable group contains at least one of: (a) a macromer-macromer functional group that reacts spontaneously or under the influence of light, heat or other activating conditions or reagents to form a covalent polymeric structure that binds strands of the macromer to one another; and (b) a reactive functional group for converting a solution of the macromer into a gel.

25. The composition of claim 24, wherein the macromer-macromer functional group is selected from the group of: (a) ethylenic groups; (b) epoxides; (c) lactams; and (d) latones.

26. The composition of claim 24, wherein the reactive functional group is selected from the group of: (a) activated esters; (b) electrophilic carbon centers; (c) conjugated ethylenic groups; (d) isocyanates; (e) isothiocyanates; (f) oxirane; (g) aziridines; (h) cyclic imides; (i) sulfhydryls; and (j) combinations thereof.

27. A method of manufacturing a composition, comprising:

mixing a carrier and an osteotherapeutic material;

wherein the carrier is a macromer comprising: (a) a water-soluble block; and (b) at least one of: (i) a biodegradable block, wherein the biodegradable block comprises a linkage based on a carbonate or ester group; and (ii) a polymerizable group.

28. The method of claim 27, wherein the composition is in the form of one of: (a) an aqueous mixture; and (b) a non-hydrated form.

29. The method of claim 28, wherein the osteotherapeutic material is selected from the group of: (a) demineralized bone matrix; and (b) cortical-cancellous bone chips.

30. The method of claim 28, wherein the osteotherapeutic material is selected from the group of: (a) an osteoinductor; (b) an osteoconductor; (c) an osteogenic factor; and (d) an osteopromoter.

31. The method of claim 28, wherein the composition is resorbed and replaced by new bone substantially throughout the volume of the composition after implantation in a vertebrate.

32. The method of claim 31, wherein a ratio of the carrier to the osteotherapeutic material is selected to provide an effective amount of each such that the composition is resorbed and replaced by new bone substantially throughout the volume of the composition.

33. The method of claim 31, wherein the osteotherapeutic material is provided in an effective amount such that the composition is resorbed and replaced by new bone substantially throughout the volume of the composition.

34. The method of claim 31, wherein the vertebrate is a mammal.

35. The method of claim 34, wherein the mammal is a human.

36. The method of claim 28, further comprising including in the composition an initiator for inducing a polymer forming reaction with the polymerizable group.

37. The method of claim 36, further comprising including the initiator in the carrier.

38. The method of claim 36, wherein the initiator is selected from the group of: (a) a photo initiator; (b) a thermal initiator; and (c) a chemical initiator.

39. The method of claim 38, wherein the photo initiator is Eosin Y.

40. The method of claim 38, wherein the chemical initiator is a peroxide.

41. The method of claim 28, further comprising applying radiation to the carrier.

42. The method of claim 28, further comprising initiating polymerization by a reaction selected from the group of: (a) photopolymerization; (b) chemical free-radical polymerization; (c) thermal free-radical polymerization; (d) redox reaction; (e) cationic polymerization; and (f) chemical reaction of active groups.

43. The method of claim 28, wherein the carrier is further comprised of a free radical generating combination of a transition metal, a peroxide, and a stabilizing agent.

44. The method of claim 28, wherein the macromer comprises at least one of: (a) poly(ethylene glycol); (b) trimethylene carbonate moieties; (c) lactic acid ester moieties; (d) acrylic ester moieties; and (e) combinations thereof.

45. The method of claim 28, further comprising including in the composition an additive to modify at least one of a physical and a chemical aspect of the composition.

46. The method of claim 28, further comprising including in the composition an additive to modify a biological aspect of the composition.

47. The method of claim 27, wherein the water soluble block is selected from the group of poly(ethylene glycol) and poly(ethylene oxide).

48. The method of claim 27, wherein the biodegradable block includes polymers and oligomers of hydroxy acids.

49. The method of claim 27, wherein the ester group includes hydroxy acid ester moieties selected from the group of glycolic acid, DL-lactic acid and L-lactic acid.

50. The method of claim 27, wherein the carbonate group is selected from a group derived from at least one of trimethylene carbonate and dimethyl carbonate.

51. The method of claim 27, wherein the polymerizable group contains at least one of: (a) a macromer-macromer functional group that reacts spontaneously or under the influence of light, heat or other activating conditions or reagents to form a covalent polymeric structure that binds strands of the macromer to one another; and (b) a reactive functional group for converting a solution of the macromer into a gel.

52. The method of claim 51, wherein the macromer-macromer functional group is selected from the group of: (a) ethylenic groups; (b) epoxides; (c) lactams; and (d) latones.

53. The method of claim 51, wherein the reactive functional group is selected from the group of: (a) activated esters; (b) electrophilic carbon centers; (c) conjugated

ethylenic groups; (d) isocyanates; (e) isothiocyanates; (f) oxirane; (g) aziridines; (h) cyclic imides; (i) sulfhydryls; and (j) combinations thereof.

54. A method of treating a bone defect in a patient, comprising:

implanting in the patient at the site of a defect a composition comprising a carrier and an osteotherapeutic material;

wherein the carrier is a macromer comprising: (a) a water-soluble block; and (b) at least one of: (i) a biodegradable block, wherein the biodegradable block comprises a linkage based on a carbonate or ester group; and (ii) a polymerizable group.

55. The method of claim 54, wherein the composition is in the form of one of: (a) an aqueous mixture; and (b) a non-hydrated form.

56. The method of claim 55, wherein the osteotherapeutic material is selected from the group of: (a) demineralized bone matrix; and (b) cortical-cancellous bone chips.

57. The method of claim 55, wherein the osteotherapeutic material is selected from the group of: (a) an osteoinductor; (b) an osteoconductor; (c) an osteogenic factor; and (d) an osteopromoter.

58. The method of claim 55, wherein the composition is resorbed and replaced by new bone substantially throughout the volume of the composition after implantation in a vertebrate.

59. The method of claim 58, wherein a ratio of the carrier to the osteotherapeutic material is selected to provide an effective amount of each such that the composition is resorbed and replaced by new bone substantially throughout the volume of the composition.

60. The method of claim 58, wherein the osteotherapeutic material is provided in an effective amount such that the composition is resorbed and replaced by new bone substantially throughout the volume of the composition.

61. The method of claim 58, wherein the patient is a mammal.

62. The method of claim 61, wherein the mammal is a human.

63. The method of claim 55, further comprising including in the composition an initiator for inducing a polymer forming reaction with the polymerizable group.

64. The method of claim 63, further comprising including the initiator in the carrier.

65. The method of claim 63, wherein the initiator is selected from the group of: (a) a photo initiator; (b) a thermal initiator; and (c) a chemical initiator.

66. The method of claim 65, wherein the photo initiator is Eosin Y.

67. The method of claim 65, wherein the chemical initiator is a peroxide.

68. The method of claim 55, further comprising applying radiation to the carrier.

69. The method of claim 55, further comprising the step of polymerization, which polymerization is initiated by a reaction selected from the group of: (a) photopolymerization; (b) chemical free-radical polymerization; (c) thermal free-radical polymerization; (d) redox reaction; (e) cationic polymerization; and (f) chemical reaction of active groups.

70. The method of claim 55, wherein the carrier is further comprised of a free radical generating combination of a transition metal, a peroxide, and a stabilizing agent.

71. The method of claim 55, wherein the macromer comprises at least one of: (a) poly(ethylene glycol); (b) trimethylene carbonate moieties; (c) lactic acid ester moieties; (d) acrylic ester moieties; and (e) combinations thereof.

72. The method of claim 55, further comprising including in the composition an additive to modify at least one of a physical and a chemical aspect of the composition.

73. The method of claim 55, further comprising including in the composition an additive to modify a biological aspect of the composition.

74. The method of claim 54, wherein the water soluble block is selected from the group of poly(ethylene glycol) and poly(ethylene oxide).

75. The method of claim 54, wherein the biodegradable block includes polymers and oligomers of hydroxy acids.

76. The method of claim 54, wherein the ester group includes hydroxy acid ester moieties selected from the group of glycolic acid, DL-lactic acid and L-lactic acid.

77. The method of claim 54, wherein the carbonate group is selected from a group derived from at least one of trimethylene carbonate and dimethyl carbonate.

78. The method of claim 54, wherein the polymerizable group contains at least one of: (a) a macromer-macromer functional group that reacts spontaneously or under the influence of light, heat or other activating conditions or reagents to form a covalent polymeric structure that binds strands of the macromer to one another; and (b) a reactive functional group for converting a solution of the macromer into a gel.

79. The method of claim 78, wherein the macromer-macromer functional group is selected from the group of: (a) ethylenic groups; (b) epoxides; (c) lactams; and (d) latones.

80. The method of claim 78, wherein the reactive functional group is selected from the group of: (a) activated esters; (b) electrophilic carbon centers; (c) conjugated ethylenic groups; (d) isocyanates; (e) isothiocyanates; (f) oxirane; (g) aziridines; (h) cyclic imides; (i) sulfhydryls; and (j) combinations thereof.

81. The method of claim 54, further comprising the step of polymerization at the site of the bone defect.

82. The method of claim 81, further comprising the step of polymerization in an operating room.

83. The method of claim 54, further comprising the step of polymerization at a time of implantation.

84. The method of claim 54, further comprising the step of polymerization at a site remote from an operating room.

85. The method of claim 84, wherein the site remote from the operating room is a place of manufacture of the composition.

86. The method of claim 54, further comprising the step of polymerization at a time of manufacture of the composition.

87. The method of claim 54, further comprising the step of processing the composition by at least one process selected from the group of: (a) dessication; (b) dry blending; (c) lyophilization; and (d) granulation.

88. The method of claim 54, wherein the carrier is in a non-hydrated form and liquid is added to the non-hydrated form in an amount sufficient to form a solution of the carrier.

89. The method of claim 88, wherein the liquid is selected from the group of: (a) sterile water; (b) saline solution; (c) lactated ringer's solution; and (d) biological fluid.

90. The method of claim 88, wherein the liquid includes one or more components that aid in polymerization.

91. The method of claim 54, wherein the composition is in a non-hydrated form and liquid is added to the non-hydrated form in an amount sufficient to form a hydrated mixture of the composition.

92. The method of claim 91, wherein the liquid is selected from the group of: (a) sterile water; (b) saline solution; (c) lactated ringer's solution; and (d) biological fluid.

93. The method of claim 91, wherein the liquid includes one or more components that aid in polymerization.

94. The method of claim 54, wherein the composition takes the form selected from the group of: (a) a powder; (b) a dough; (c) a paste; (d) a solid; (e) a semi-sold; (f) granules; (g) a fiber; (h) a fabric; (i) a film; and (j) a monolithic.

95. The method of claim 54, further comprising the step of processing the composition by at least one process selected from the group of: (a) physical admixture; (b) covalent attachment; (c) ionic attachment; and (d) physical interpenetration.

96. The method of claim 54, further comprising the step of mixing the composition with fluid and then implanting.

97. The method of claim 54, further comprising the step of implanting the dry composition and then hydrating with a fluid.

98. The method of claim 54, further comprising the step of using the composition as a coating for an implant.

99. The method of claim 98, wherein the implant is selected from the group of: (a) a spinal cage; (b) a screw; (c) a knee/hip implant; (d) a periodontal implant; and (e) a craniofacial implant.

100. The method of claim 54, further comprising using the composition to grow bone outside the patient before implantation.

101. The method of claim 100, wherein the bone is grown outside the patient in a bioreactor.

102. A method of growing bone in a patient, comprising:

implanting at a heterotopic site in the patient a composition comprising a carrier and an osteotherapeutic material;

wherein the carrier is a macromer comprising: (a) a water-soluble block; and (b) at least one of: (i) a biodegradable block, wherein the biodegradable block comprises a linkage based on a carbonate or ester group; and (ii) a polymerizable group.

103. The method of claim 102, wherein the composition is in the form of one of: (a) an aqueous mixture; and (b) a non-hydrated form.

104. A composition, comprising:

a carrier; and

an osteotherapeutic material;

wherein the carrier is a macromer comprising: at least one water-soluble block; at least one biodegradable block, wherein the biodegradable block comprises a linkage based on a carbonate or ester group; and at least one polymerizable group.

105. The composition of claim 104, wherein the composition is in the form of one of: (a) an aqueous mixture; and (b) a non-hydrated form.

106. A method of manufacturing a composition, comprising:

mixing a carrier and an osteotherapeutic material;

wherein the carrier is a macromer comprising: at least one water-soluble block; at least one biodegradable block, wherein the biodegradable block comprises a linkage based on a carbonate or ester group; and at least one polymerizable group.

107. The method of claim 106, wherein the composition is in the form of one of: (a) an aqueous mixture; and (b) a non-hydrated form.

108. A method of treating a bone defect in a patient, comprising:

implanting in the patient at the site of the defect a composition comprising a carrier and an osteotherapeutic material;

wherein the carrier is a macromer comprising: at least one water-soluble block; at least one biodegradable block, wherein the biodegradable block comprises a linkage based on a carbonate or ester group; and at least one polymerizable group.

109. The method of claim 108, wherein the composition is in the form of one of: (a) an aqueous mixture; and (b) a non-hydrated form.

110. A method of growing bone in a patient, comprising:

implanting at a heterotopic site in the patient a composition comprising a carrier and an osteotherapeutic material;

wherein the carrier is a macromer comprising: at least one water-soluble block; at least one biodegradable block, wherein the biodegradable block comprises a linkage based on a carbonate or ester group; and at least one polymerizable group.

111. The method of claim 110, wherein the composition is in the form of one of: (a) an aqueous mixture; and (b) a non-hydrated form.